Effect of Irrigation, Surfactant and Fertilizer Rates on Chlorophyll Content in Tomato Leaves

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INTRODUCTION

- Tomato is one of the most important vegetables grown in the United States.
- Due to continuous rise in the cost of fertilizers and irrigation water crisis, there is a need to continuously find ways for efficient use of fertilizers and irrigation water, without affecting the quality and quantity of the tomatoes
- Soil surfactants can potentially enhance water and nutrient uptake by plants, and thereby optimize overall crop productivity.

OBJECTIVE

•The objective of this study was to evaluate the influence of surfactant, Nitrogen (N) fertilizer and irrigation rates on the chlorophyll content of tomato leaves

MATERIALS & METHODS

- During summer 2011, Variety Quality 23 tomatoes were grown on sandy loam soil, at California State University farm.
- Experimental design of split-split plot design with eight treatment and three replications.

Spad meter measures the chlorophyll content in the plants, only by clamp the meter over the leafy tissue, with this information nutrient absorption and health trends can be identified before they're visible to human eye.

ACKNOWLEDGMENTS

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Treatments:

Irrigation: 3 rates based on % total ET by subsurface drip irrigation technique.

Surfactant: 2 treatments without and with surfactant @ 0.5 gallons/acre 1DAT and 0.25 15 and 30DAT.

Fertilizer: 3 rates of UAN 32 in six splits.

Block 3			Block 2			Block1		
I2	I3	I1	I1	I3	I2	I3	I2	I1
(49) F2-S1	(43) F1-S2	(37) F2-S1	(31) F1-S2	(25) F1-S2	(19) F2-S2	(13) F1-S2	(7) F2-S1	(1) F1-S1
(50) F3-S1	(44) F3-S2	(38) F1-S1	(32) F2-S2	(26) F3-S2	(20) F3-S2	(14) F2-S2	(8) F1-S1	(2) F2-S1
(51) F1-S1	(45) F2-S2	(39) F3-S1	(33) F3-S2	(27) F2-S2	(21) F1-S2	(15) F3-S2	(9) F3-S1	(3) F3-S1
(52) F3-S2	(46) F1-S1	(40) F3-S2	(34) F3-S1	(28) F2-S1	(22) F3-S1	(16) F3-S1	(10) F2-S2	(4) F1-S2
(53) F1-S2	(47) F2-S1	(41) F1-S2	(35) F2-S1	(29) F3-S1	(23) F1-S1	(17) F2-S1	(11) F1-S2	(5) F2-S2
(54) F2-S2	(48) F3-S1	(42) F2-S2	(36) F1-S1	(30) F1-S1	(24) F2-S1	(18) F1-S1	(12) F3-S2	(6) F3-S2
Beds 25-27	Beds 22-24	Beds 19-21	Beds 16-18	Beds 13-15	Beds 10-12	Beds 7-9	Beds 4-6	Beds 1-3

LEGEND	Irrigation	% ET		Surfactant	gal/acre		Fertilizer	lbs N/acre
	I1	100		S1	0		F1	100
	I2	80		S2	1		F2	150
	I3	60					F3	200

Numbers 1 to 54 in ( ) represent the sub plots, which are 3 beds x 25 feet long = 3 beds x 5'/bed x 25' = 375 sq. ft .

Data Analyses:

•Spad reading was done at 30 days after transplant, on 08/11, and then on 08/19, 08/25, 09/02 and 09/09.

•Statistical analysis was done at P value of 0.06 using GLM model of SPSS 20.

RESULTS

Fig.1

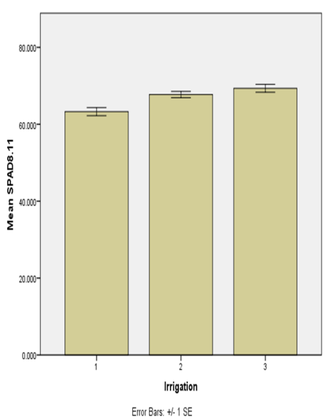
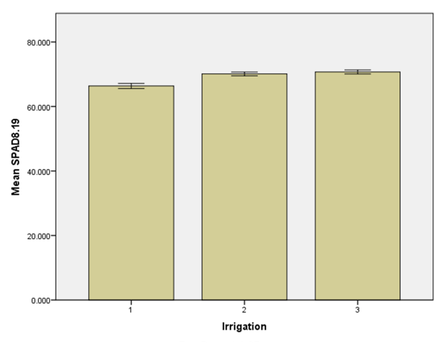


Fig.2



• On 8/11 (Fig.1), irrigation had significant effect on leaf chlorophyll content at p = 0.06, irrigation rate of 80(I2) and 60(I3) percent of the total Evapotranspiration (ET) by subsurface drip irrigation technique.

•On 8/19 (Fig.2), irrigation had significant effect on leaf chlorophyll content at p = 0.06, irrigation rate of 80(I2) and 60(I3) percent of the total Evapotranspiration (ET) by subsurface drip irrigation technique.

RESULTS CONT'D

Fig.3

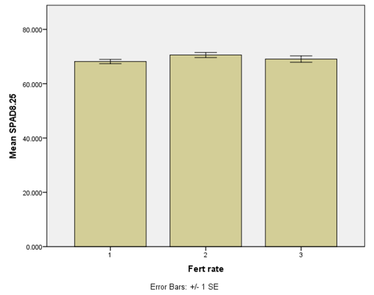


Fig.4

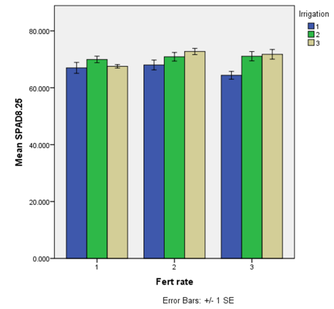
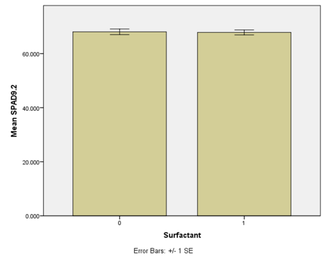


Fig.5



- On 8/25 (Fig.3), fertilizer had significant effect on leaf chlorophyll content at p=0.06, fertilizer rate of UAN 32 200(F3) pounds N/acre.
- On 9/02 (Fig.5), surfactant had no significant effect on leaf chlorophyll content at p=0.06.

CONCLUDING REMARKS

Overall, there was a slight decrease in the chlorophyll contents in leaves as the tomatoes progressed from immature green to full red stage (harvest). At first ripe stage, irrigation rates had a significant effect (P = 0.06) on leaf chlorophyll content. At harvest, there was no significant difference in the chlorophyll content due any of the three factors investigated in this study. It is noteworthy that unlike other studies reported in the literature, the chlorophyll contents measured with the SPAD meter in this study did not show any positive correlation with the nitrate concentrations determined in leaf petioles. In future studies, we intend to investigate the correlation between chlorophyll readings and total nitrogen content of the leaves.

Refrences: USDA ; United States Department of Agriculture http://www.nass.usda.gov/

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